

CLAIMS

1. An electrical signalling system, comprising:
  - a modulator, arranged to accept information and produce an alternating signal containing repeated rising and falling edges in which the information is encoded, the encoding being by way of the time between consecutive rising or consecutive falling edges;
  - a transmission path for the signal from the modulator to a demodulator,
    - wherein the demodulator is arranged to detect the signal edge and store a record of the signal around that edge, and to compare a subsequent part of the signal with that record thereby to detect a like edge and detect the time difference between like edges.
2. An electrical signalling system according to claim 1 in which the record is in the form of a digitised version of the signal.
3. An electrical signalling system according to claim 1 or claim 2 in which the record is compared with a subsequent part of the signal.
4. An electrical signalling system according to claim 3 in which a second like edge is detected notwithstanding noise-induced differences between the subsequent signal and the record.
5. An electrical signalling system according to claim 4 in which the error limit is measured by way of an rms value of the difference in the signals.
6. An electrical signalling system according to claim 5 in which the rms value of the difference in the signals is calculated for a range of possible time difference and the time difference for which the difference is minimised is selected.

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7. An electrical signalling system according to any one of the preceding claims in which the transmission path is imperfect.
8. An electrical signalling system according to any one of the preceding claims in which the transmission path is inductive.
9. An electrical signalling system according to any one of the preceding claims in which the transmission path is a three-phase electrical supply cable.
10. An electrical signalling system according to claim 9 in which the three-phase electrical supply cable leads to downhole equipment for extraction of oil or gas.
11. An electrical signalling system according to any one of the preceding claims in which the demodulator also detects unlike edges and then detects the time difference therebetween.
12. An electrical signalling system according to any one of the preceding claims in which the modulator is adapted to include multiple sources of data consecutively.
13. An electrical signalling system according to claim 12 in which the modulator includes  $(n+1)$  signals, including  $n$  signals of information to be encoded and a synchronisation signal.
14. An electrical signalling system according to claim 13 in which the synchronisation signal takes the form of a unique pulse.
15. An electrical signalling system according to claim 14, in which the unique pulse is shorter or longer than the limits of acceptable pulse size for the encoded data.
16. An electrical signalling system according to claim 14 in which the unique pulse is at a different signal level to the signals conveying encoded information.

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17. An electrical signalling system according to any one of the preceding claims in which the data is encoded such that a specific range of pulse times correspond to a specific value or range of values of the input information.
18. An electrical signalling system according to claim 17 in which the ranges of values of the input information are of identical width.
19. An electrical signalling system according to claim 17 in which the ranges of values of the input information are of variable width.
20. An electrical signalling system according to any one of the preceding claims in which a first signal indicates the coarse range of the input information and a second signal indicates the fine value of the input information.
21. An electrical signalling system according to claim 20 in which the first signal is encoded according to a different protocol to the second.
22. An electrical signalling system according to claim 1 in which the record consists of selected values of the signal at selected times.
23. An electrical signalling system according to claim 22 in which there are a plurality of selected times.
24. An electrical signalling system according to claim 22 or claim 23 in which the at least one selected time is chosen by reference to the signal value.
25. An electrical signalling system according to claim 24 in which an at least one selected time is the time at which the signal crosses a value intermediate the values between which the signal alternates.
26. An electrical signalling system according to any one of the preceding claims in which the comparison of the signal and the record is by way of comparing the signal values at specific times.

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27. An electrical signalling system according to any one of claims 22 to 25 in which the comparison of the signal and the record is by way of comparing the times at which specific signal values are detected.
28. An electrical signalling system substantially as described herein with reference to and/or as illustrated in the accompanying figures.